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A NEW TRICHODECTES FROM THE GOAT.

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The domestic goat has long been known to harbor a Mallophagan (biting louse) species peculiar to it and to one or two related wild forms, most notably the chamois. This parasite, *Trichodectes climax*, was recognized by Nitzsch a century ago, and has since been recorded from domestic goats in all part of the world. It is a cosmopolitan parasite species because its host is cosmopolitan.

Also it is the only Trichodectes until now found on the domestic goat. It is characteristic of the goat just as another *Trichodectes* species, *sphærocephalus*, is characteristic of a certain nearly related host, the domestic sheep and two or three of its wild congeners, (*Ovis ornata, O. melanocephala, et al.*). So far sheep have not been found to harbor any other Mallophagan than *T. sphærocephalus*.

But the goat, at least certain individuals of the merino goat, living in California, do afford food and shelter to another and larger species of *Trichodectes* than the long-known and widespread *climax*. This species we are describing in this paper.

The specimens of the new species (many males and females) were received this month (November) from Professor W. B. Herms of the University of California, who took them from a "young merino goat received from near Inverness, Marin County, California." Professor Herms reports the goat as "very badly infested," adding in a later letter, that he has "never before seen an animal so badly infested with biting lice as is the goat in our possession, and I am told other goats in the flock from which this one was taken are equally infested."

The new species is unusually large for a Trichodectes, the females being more than two millimeters in length (some individuals almost 2½ mm.), the males not quite so long. *T. climax* hardly attains a length of one and a half millimeters. In the shape of head and abdomen, the curious covering of short, fine spiny hairs, and in the markings, the new species of differs strongly from *climax*. It shows more of a resemblance, in shape and markings of head, and general appearance of body to *T. penicillatus* than to any other species of the genus, which resemblance, if it suggests any near relationship—it probably does not—is most extraordinary, as *penicillatus* has been recorded only from a kangaroo! However, it has been recorded but once, and that by Piaget, its describer, who had his specimens from a single kangaroo (*Macropus penicillatus*) in the Zoölogical Garden at Rotterdam. Zoölogical garden specimens of Mallophaga are always open to suspicion as to the host records, the conditions, especially in such a crowded garden as I remember the Rotterdam one to be, being unusually favorable for straggling. However, the resemblances between *T. penicillatus* and our new species from the goat may be only superficial and non-significant of relationship. The new species may be described as follows:

Trichodectes hermsi sp. nov. (Fig. 1).

Many males, females and young from a young merino goat, Inverness, Marin Co., Calif. (coll. W. B. Herms).

Female: Body, length 2.4 mm., width (widest across fifth abdominal segment), 1.32 mm., head, length .44 mm., width .57 mm. General color pale yellowish brown, the head and thorax and the median abdominal blotches darker than the almost whitish ground color of the abdomen. Dorsal surface of the whole body with a sparse covering of short, fine, spine-hairs. In addition there are longer hairs along the lateral margins and in regular segmental transverse series on the abdomen.

The head is broader than long, the region behind the antennae being distinctly and suddenly broader than the part in front. The clypeal margin is flatly convex, and the occipital margin shallowly concave. The antennae are long enough to reach, if bent directly backward, to the hind lateral angles of the head, but no farther than that. The head is uni-colored, showing no markings except the slightly darker narrow margin all around, and a pair of short, distinct narrow bands (more like small linear blotches) extending from base of antennae to the clypeal margin. Several not long hairs in each temporal angle and the whole head sparsely covered with short, fine spine-hairs.

Prothorax with sharply produced, conspicuous lateral angles, with a group of five or six rather strong, although not long, hairs in each angle. It is much wider than long, as is also the metathorax which is about the same width as the prothorax, but is a little longer. The metathorax has a doubly angulated posterior margin, with the median portion concave. There are numerous longish stiff hairs along the postero-lateral margins of the segment, and a transverse dorsal series of a dozen or more hairs across the segment near the posterior margin. The legs have the single tarsal segment unusually long and distinct, and the tibiae bear numerous short but distinct and sharp spine-hairs.

The abdomen is large and thick, symmetrically elliptical with broad ends, and covered sparsely with minute pointed spine-hairs. There is also a transverse series of longer but fine spine-hairs across the dorsal surface of each segment just in front of the posterior margin of the segment. There are numerous longer hairs on the lateral margins of each segment, and a brush of longish hairs on the posterior margin of the last segment. At each side of the next to last segment there is a chitinized backward-projecting, pointed process, slightly curved and angulated in the middle, with the convexity on the outside. The ground color of the whole abdomen is pale yellowish-white, of more golden color along the lateral margins, and with a series of seven brownish median blotches, largest and darkest on segments 7 and 8. The next to the last segment is nearly covered by two pale translucent, brownish blotches, partly fusing on their inner faces.

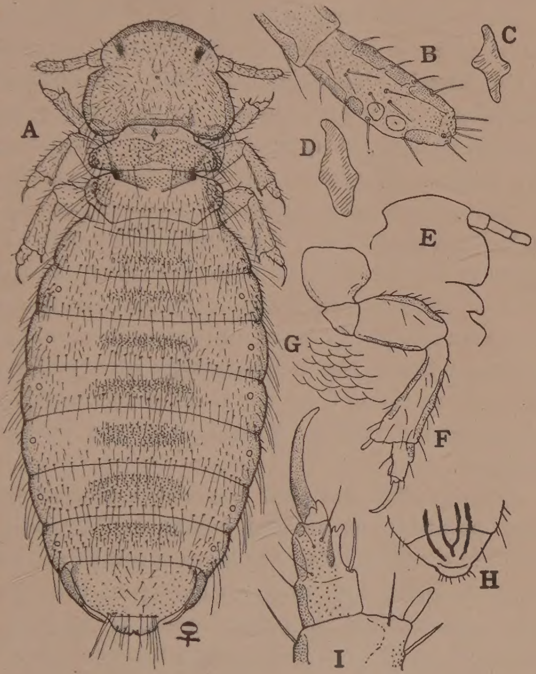

Fig. 1. *Trichodectes hermsi* n. sp.; A, female; B, last antennal segment of female, showing sense pits; C, small chitinized sclerite at middle of occipital margin of head of male; D, same of female; E, outline of head of male; F, hind leg of female; G, part of abdominal body-wall showing scaly covering; H, tip of abdomen of male, showing genitalia; I, tarsus and tarsal claw of hind leg of female.

Male: Body, length 1.68 mm., width .61 mm., head, length .34 mm., width .47 mm.; thus much smaller than the female, and with abdomen with sides more nearly parallel, converging posteriorly. The head is a little different in shape, the anterior, or clypeal, portion not extending so far in front of the antennae and more flatly rounded. The genitalia show distinctly through the body-wall, although they are not heavy or strongly chitinized. The parameres are long, narrow and pointed.

THE LUMINOUS ORGAN OF THE NEW ZEALAND GLOW-WORM.[1]

By W. M. Wheeler and F. X. Williams.

The earliest description of the New Zealand glow-worm seems to be given in a brief note by Meyrick published in the *Entomologists' Monthly Magazine* for 1886. This observer found a number of larvæ, which he supposed to be those of a Staphylinid beetle, on the damp, precipitous banks of a densely shaded creek near Auckland. The larvæ were described as burrowing "in the earth, exposing the head and anterior portions from the burrow but having in front of them a sort of irregular slimy network." They occurred in such numbers that more than fifty were counted in a square foot of surface. Meyrick states that the same or a similar species has been noticed in caves and mines in other parts of New Zealand. He says that "the light consists of a small light-greenish white erect flame rising from the back of the neck," and that the food of the creature consists of minute insects probably attracted by its light.

During 1886 and 1887 Hudson published accounts of the insect and pointed out several errors in Meyrick's description. He showed that the luminous larva is not so numerous in a given area, that its light does not proceed from the neck but from a large glutinous knob at the posterior end of the body and that it inhabits irregular cavities in the earthen banks "where it hangs suspended in a glutinous web, which also appears to envelop the body, large quantities of sticky mucous being periodically shot out of the mouth of the larva and formed into threads as required." Hudson supposes that the larva feeds on decaying vegetable matter. He saw the light displayed most brilliantly at 3 or 4 o'clock in the morning but on several occasions observed no light all the evening. The light does not serve to attract food but "to assist the larvæ in escaping from enemies, as when disturbed they nearly always gleam very brilliantly for a few seconds, suddenly shutting off the light and retreating into the earth." The imago reared in the breeding cage proved to be a Tipulid fly which was identified as *Trimicra pillipes* by Baron Osten-Sacken. The noted dipterist, however, regarded the luminous larvæ sent to him as those of a Mycetophilid (1886).

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[1] Contributions from the Entomological Laboratory, Bussey Institution, Harvard University, No. 86.

A more exhaustive account of the life-history of the New Zealand glow-worm was published by Hudson in 1891. He studied the insect in the deep ravine of the botanical garden at Wellington and with some difficulty worked out its transformations. It proved to be a Mycetophilid and was described by Skuse as *Bolitophila luminosa* in an appendix to Hudson's paper. The imago, identified by Osten-Sacken as *Trimicra pallipes* did not, therefore, develop from one of the luminous larvæ but from another larva that had accidentally entered Hudson's breeding cage. The pupa of the *Bolitophila* is figured with a large branched and apparently tracheal process on the prothorax. The anal segment was found to be luminous in life and the imaginal flies, all of which proved to be females, were also luminous, emitting from the tip of the abdomen "a strong light about half as bright as that emitted by a full grown larva."

On September 5, 1914, the senior author, while visiting New Zealand, took part, through the kindness of Mr. T. F. Cheeseman, in an excursion to the Waitakari Forest, near Auckland, for the purpose of inspecting some of the few large surviving kaori-pines (*Agathis australis* Salisb.). In order to reach the forest by a short cut it was found convenient to traverse a dark tunnel many yards in length excavated through a small mountain and serving as a viaduct for a pipe from a large reservoir to the water-works of the city of Auckland. The walls of this tunnel were spangled with beautiful blue-green sparks, which proved, on examination, to be the luminous *Bolitophila* larvæ described by Hudson. They varied from about 1 to 3.5 cm. in length and were living on slender glutinous threads which, in some cases, depended from the ceiling of the tunnel. Several of them, transferred to a moist vial, were later examined under a strong pocket lens and showed the luminous organ very distinctly in the dilated ovoidal terminal segment of the body. This segment bears a pair of small, jointed cerci and is, therefore, probably the eleventh abdominal metamere. The organ appeared as four parallel rods closely applied to one another in the middle of the vesicle on the ventral surface of the very slender rectum. Their long axes were parallel with the long axis of the body and all were slightly curved, so that the oblong plate which they formed together was concave on the dorsal and convex on the ventral surface. They gave off a bluish-green light most intensely from their dorsal surfaces, as their ventral surfaces appeared to be covered with a vague mass of reflecting tissue.

The specimens were killed in 50 per cent. and then transferred to 70 per cent. alcohol, which seemed to preserve them sufficiently well for subsequent study. The junior author sectioned a number of the specimens and stained them with Heidenhain's iron hæmatoxylin. He also obtained excellent views of the structures as whole mounts or partial dissections stained in alum cochineal.

Fig. 1, Pl. 3, represents one of the larvæ in lateral view. The head is very small, with minute eyes; the long body grows broader posteriorly and terminates in a bulbous enlargement or vesicle, separated by a distinctly constricted region from the more anterior segments. If this constricted region is counted as a segment the abdomen has the full number, eleven, of segments characteristic of insects. Hudson's figure of the larva (Pl. 8, Fig. 1) is certainly incorrect, since it represents no less than nineteen post-thoracic segments and the outline of the terminal bulbous segment is defective. It is probable that this region in our figure is too small, as it was drawn from a preserved and perhaps somewhat shrunken specimen.

The peculiar glutinous web on which the larva moves about is evidently secreted by a pair of voluminous spinning glands situated in the anterior two thirds of the body. Their posterior tips are represented at SG in Fig. 2, which is drawn from a dissection of the slender hind-gut and the accompanying Malpighian tubules in the posterior third of the body as seen from the ventral side. These Malpighian tubules are four in number as in other Diptera and all come off at the same level, run forward a short distance and then turn back with more or less convolution, applying themselves to the sides of the slender intestine. They gradually diminish in diameter till they become very tenuous and straight in the constricted region just anterior to the terminal vesicle and are there closely applied to one another side by side on the ventral surface of the rectum. Then they separate along the median line into two pairs and again come together but increase two and one-half to three times in diameter in the vesicle where they terminate with rounded tips. It is these dilated tips of the four Malpighian tubules which appear as the four curved, luminous rods in the living larva and, therefore, constitute the photogenetic organ. What to all appearances serves as a reflector is represented by a layer of tissue (R, Figs. 3 and 7) of variable thickness, covering much and in life perhaps all the ventral surface of the dilated ends of the tubules. A pair of large tracheæ, shown at T, enters this layer and each breaks up almost immediately into three branches, one of which runs back between each of the two pairs of Malpighian tubules. The reflecting layer seems to be a syncytium made up of the hypertrophied and finely vacuolated tracheal epithelium, as it reveals no cell boundaries. It contains numerous small nuclei which are all at one level well within the mass (Fig. 7) and close to the chitinous tracheal intima. Anteriorly the reflecting layer extends for a short distance along the two main tracheal trunks, but posteriorly it thins out into a membrane which partly serves to secure the tubules to the rectum. Some slender longitudinal muscles, shown at M in Fig. 3, have the same function. It is probable that the reflecting syncytium may in life contain numerous fine vacuoles of a fatty substance which has been dissolved away in the mounted preparations. We do not believe that this layer is derived from the fat-body, because the latter, as shown in Fig. 5, consists of larger cells with definite boundaries and large, spherical nuclei.

It thus appears from dissection that the Malpighian tubules are each differentiated into two portions with very different functions, viz., a short distal piece which is photogenetic and a long proximal portion which retains the primitive excretory function of these organs. The portion anterior to the subterminal constriction of the body shows in both stained and unstained material a more opaque and vacuolated structure of its cells, with darker nuclei; the slender intermediate region (Fig. 2S) is much more transparent and its nuclei are paler, while the photogenetic portion is also rather pale but consists of much larger cells. In sections these structural differences are even more marked. No sections were taken near the points of origin of the Malpighian tubules, but it is evident from a specimen stained *in toto* that the lumen is here quite large. A section through the middle region is shown in the lower of the two drawings in Fig. 4. The wall of the tubule shows only two cells, both so much swollen as to reduce the lumen to a mere line, except at one side where the wall is reduced to a mere membrane bounding a small passage. The canal may be even more reduced than in the section figured, but it is commonly slit-like and was never seen to be large and circular in this region. The cells are vacuolated and contain some darkly staining granules. A section through the intermediate narrow portion of the tubule just in front of the photogenetic region and corresponding with the point S in Fig. 2 is shown in the upper drawing of Fig. 4. The lumen, though similar to that in the anterior region, is more evident. The cell content is denser and more granular and approaches that of the cells in the luminous organ. All four tubules of this latter region are shown in cross-section in Fig. 7. They are circular, with large lumina, and the walls consist of four well-defined cells, with large spherical nuclei. Their cytoplasm is throughout densely packed with minute granules which stain very deeply, so that the tubules stand out in marked contrast with the underlying reflecting layer. Evidently these granules correspond in function with the photogenetic granules in the luminous organ of the fire-fly. Vacuoles are rare or altogether lacking in these cells, as in the section figured. The lumina of the tubules often enclose a granular deposit which may represent the stained residue of a liquid contained in them during life. The extreme tips of the Malpighian tubules, shown in section in Fig. 6, recall the structure of the anterior excretory portion, since the large granular cell-wall here thins out dorsally to a delicate membrane which closes the end of each of the tubules.

Although the luminous organ of the pupal and imaginal *Bolitophila* has not been studied we may safely assume that it is the same as that of the larva. This is clearly indicated by Hudson's statement that in both the larval and pupal instars it is the last abdominal segment which is luminous, and the fact that at least in Nematoceran Diptera, if we accept the studies of Vaney (1902) on *Simulium* and *Chironomus*, the larval Malpighian tubules are not broken down during metamorphosis but persist with their structure essentially unaltered in the pupa and imago.

The conversion of the distal portion of each of the four Malpighian tubules into a luminous organ in *Bolitophila* is of considerable interest both morphologically and physiologically; morphologically because a single, definite organ is formed by the union or "allelotaxis" of parts of four discrete structures in a manner somewhat analogous to that of the formation of the pituitary body of the Mammalian embryo, and physiologically, because in no other insect are the Malpighian tubules known to have a photogenetic function. Still the assumption of this unusual function does not at present come as a very great surprise, because, though the Malpighian tubules seem to be purely excretory in the great majority of insects, several cases have recently come to light of their acquisition of another function. Thus it has been shown that in larvæ belonging to widely different orders, such as *Chrysopa*, *Myrmeleon* and *Sisyra* among the Neuroptera, and *Lebia* and probably also *Phytonomus* and other Rhynchophora among the Coleoptera, portions of the Malpighian tubules have taken on a secretory function and produce the silk from which the cocoon is spun. The Malpighian tubules of insects are, therefore, functionally more plastic organs than we had supposed and present in this respect a certain analogy to the fat-body, which commonly combines the functions of hæmatopoësis, and the storing of fatty and albuminoid substances and urates. Less frequently, however, the fat-body shows a development of certain of its parts into photogenetic organs (Lampyridæ) and into isolated cells (mycetocytes of Blattidæ) or organ-like cell-aggregates (mycetomata of many Homoptera), which serve as the habitacula of symbiotic Bacteria and Saccharomycetes.

The only other luminous Mycetophilid to which we have been able to find a reference in the literature is *Ceroplatus sesioides*, described many years ago by Wahlberg (1849) from Sweden. The larvæ of this insect live gregariously beneath a glutinous web on the under surfaces of mushrooms (*Polyporus fomentarius*). Wahlberg found the whole body to be luminous in the larval and pupal but not in the imaginal stage. His brief account would seem to indicate that photogenesis in this species, as in certain Chironomidæ, may be due to the presence of phosphorescent Bacteria.

We have endeavored to discover the nature of the food of the larval *Bolitophila luminosa* from examination of the contents of the alimentary tract both in dissections and sections and have found that the creature undoubtedly subsists on insects. The intestine in all the specimens examined was loosely filled with small pieces of chitin, often covered with hairs. Some of the pieces belonged to small gnats allied to the Chironomidæ. In one case a mandible of some small insect larva was found among the fragments. No traces of vegetable matter could be detected. As the head and mouthparts of the larva are extremely small it seems very unlikely that it can seize and dismember active, living prey. It is much more probable that small flying or creeping insects are caught and killed or disabled in the glutinous web and then leisurely devoured by the larva when it comes upon them in its wanderings along the threads. Hudson rejects this supposition on what appears to us to be rather feeble negative evidence. The nature and arrangement of the web certainly indicate that it is used as a trap. He describes it as follows in his second paper (1891): "The web referred to above is suspended in a rocky or earthy niche in the banks of streams in the densest parts of the forest. It consists of a thick glutinous thread stretched across the niche, and supported by several smaller threads running right and left, and attached to the sides and end of the cavity. On this the larva invariably rests, but when disturbed immediately glides back along the main thread, and retreats into a hole which he has provided at the end of it. From the lower side of this central thread numerous smaller threads hang down, and are always covered with little globules of water, resembling a number of minute silver-beaded necklaces, constituting a conspicuous, though apparently unimportant, portion of the insect's web."

That the web must serve as a trap is suggested also by O. F. Cook's recent description (1913) of a similar though more elaborate structure spun by what is in all probability a Mycetophilid larva in the caves of Alta Verapaz, Guatemala. In this case the glutinous web is figured and described as resembling "the rope signals that are hung near bridges and railroad tunnels to avoid accidents to train-crews." Cook found embedded in the slimy threads several small insects such as mosquitoes and other soft-bodied species and even a small beetle, and believes that these constitute the food of the larva.

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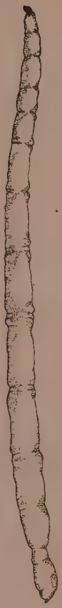

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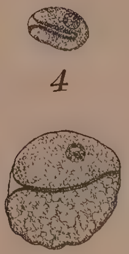

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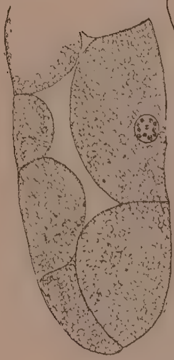

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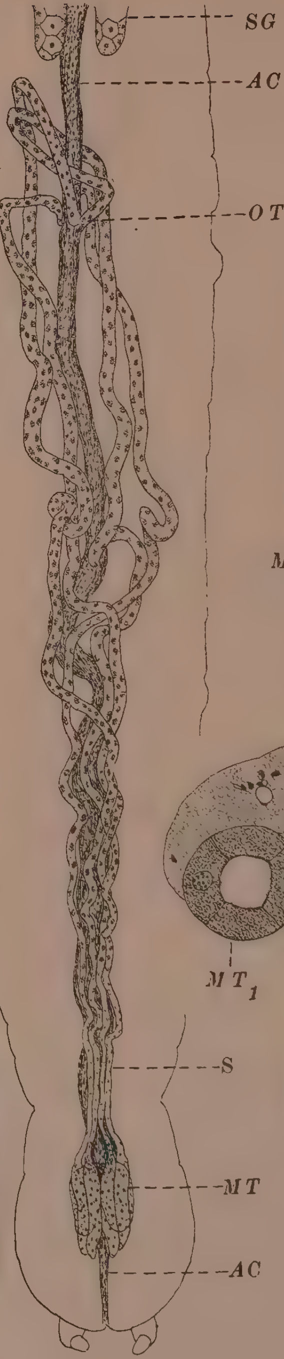

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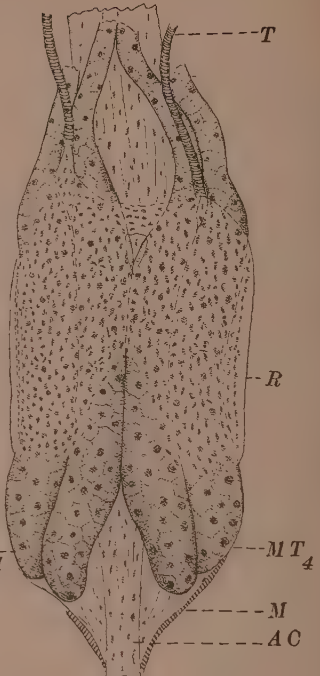

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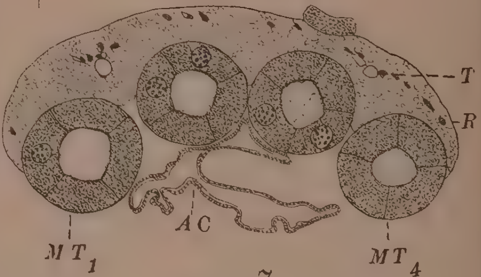

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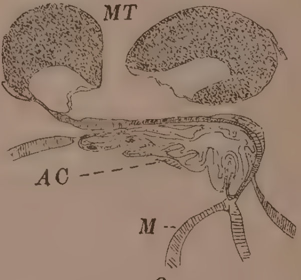

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EXPLANATION OF PLATE 3.

Abbreviations used: AC, alimentary canal; M, muscle; MT, MT $_1$, MT $_4$, portions of Malpighian tubules forming photogenetic organ; OT, point of origin of Malpighian tubules; R, reflector; S, slender, intermediate region of Malphigian tubule; SG, salivary gland; T, trachea.

Fig. 1. Full-grown larva of *Bolitophila luminosa*, from an alcoholic specimen; lateral view.

Fig. 2. Caudal third of body of larva, showing alimentary canal and Malpighian tubules; ventral view.

Fig. 3. Distal portion of Malpighian tubules modified to form photogenetic organ; ventral view.

Fig. 4. Cross-sections through Malpighian tubules; the smaller, upper section from the region S, Fig. 2, the larger, lower one from a region much further forward.

Fig. 5. Section of a piece of the fat-body from the last abdominal segment.

Fig. 6. Cross-section through tips of photogenetic portions of two of the Malpighian tubules.

Fig. 7. Cross-section through the middle of all four of the Malpighian tubules in the photogenetic region. The reflecting layer R is ventral.

OBSERVATIONS ON THE LIFE HISTORY OF *MERACANTHA CONTRACTA* (BEAUV).

By J. A. Hyslop,
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Early in the spring of 1913, while searching for the larvæ of *Trichophorus* (*Ludius* Latr.) about the bases of very much decayed stumps on the top of the South Mountain Range near Wolfsville, Md., I found many of the oddly shaped larvæ of this beetle. This larva is very unique, being the only North American Tenebrionid with the ninth abdominal segment so formed. Candèze figures[1] a very similar larva, which he determines as the larva of *Tenebrion* sp., from Ceylon which, he states, lives under sod. The species is very common and the larva has been recognized since 1849 when S. S. Haldeman[2] briefly but lucidly described it under the name *Physocoelus inflatus* Dej. which name he later[3] referred to synonomy under *Helops contractus* (Beauv.). An editorial note in the *American Entomologist*[4] refers to this larva as being found in the stomach of a bluebird. More recently, H. F. Wickham[5] has given a much more detailed description with several figures of this larva.

Larva: (Pl. 4, Figs. a–j.) The body is elongate, cylindrical; tegument highly chitinized, very sparsely beset with long fine yellow hairs; color reddish brown, paler ventrally and posterior margins of segments darker. Head globular, bent downward, mouth directed forward and downward; a pair of large inconspicuous ocelli near base of antennæ; front convex, finely and sparsely punctate, exterior angles produced into broad lateral lobes to antennal area, frontal sutures strongly curved outward; epicranial suture moderately long. Post-labrum[6] transversely oblong, distinct and slightly produced, post labial suture pronounced, anterior and posterior margins parallel, anterior third membranous. Labrum distinct, semicircular in outline, anterior edge slightly truncate and beset with strong bristles. Mandibles (Figs. d, f, g) stout but not exceptionally long, trifaced pyramidal; outer face convex with a convex disc shaped area impressed on basal half, a few slight transverse sulci, and a strong bristle near middle beyond impressed

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[1] Histoire des Metamorphoses de quelques Coleoptères Exotiques, p. 79, pl. VI, fig. 11 and 11a.

[2] Proc. Amer. Assn. Adv. Sci., Vol. II, p. 347. 1849.

[3] Proc. Acad. Nat. Sci. Philadelphia, V, p. 5. 1850.

[4] Amer. Ent., Vol. III, p. 201. 1880.

[5] Journ. New York Ent. Soc., IV, p. 119–121.

[6] This term was first used by Lyonet in his "Traite anatomique de la Chenille qui ronge le Bois de Saule. A la Haye, ed. 2, 1862," and seems very appropriate.

area; dorsal face slightly concave; inner face concave with three stout blunt teeth on dorsal edge and one similar tooth on ventral edge, these teeth are all beyond the outer third of the mandible; molar area (Fig. d, 1) strongly produced, obliquely quadrate and concave, with outer ventral edge drawn out into a stout tooth, concave surface transversely carinate. Gula (e, 11) trapeziform; submentum (e, 3) broad, hexagonal; mentum (e, 2) trapeziform with narrower edge directed posteriorly, as long as submentum but narrower and bearing a pair of bristles at base; labium (e, 1) roughly pentagonal smaller than mentum; ligula pronounced and armed with a pair of short spines; labial stipes (e, 10) moderately large; labial palpi (e, 9) two jointed, joint one short and broader than long, joint two equal in length to one but only as wide as long. Maxillæ large; articulating membrane (e, 4) between submentum and cardo slightly chitinized, quite large; cardo (e, 5), large, triangular; maxillary stipes (e, 6) large; maxillary palpi (e, 8) three jointed; lacinea (e, 7) broad and armed with two rows of broad short spines. Hypopharyngial chitinization (Fig. b) tricuspid, with surface concave, highly chitinized. Antennæ (Fig. c) situated at base of mandibles, three jointed, basal membrane large protuberant slightly chitinized, joint one nearly as broad as long slightly widened distally, joint two clavate, twice as long as wide, surmounted with a cushion like membranous cap on which is situated a small disc like antennal appendage and the small third joint; third joint less than one-fifth length of second joint, cylindrical, one-third as wide as long, bears two small hairs; antennæ slightly retractile. First thoracic segment as long as broad, anterior margin finely striate; second about one-half as long as first and third a little longer than second. Legs (Fig. i) moderately long, coxa as long as femora and trochanter taken together, scoop shaped with concave membranous surface to receive femora when in repose, edges of this surface beset with hairs; trochanter large, triangular and serving as a support for femora, over the inner two-thirds of which it is prolonged; femora stout and short; tibia equal to femora in length but more slender; tarsus unguiform, in length almost equal to tibia; femora and tibia with stout spines on inner edge. Mesothoracic spiracle oval and twice as long as the abdominal spiracles. Ten abdominal segments, one to eight about equal in diameter and length, posterior borders strongly deflexed but not striate, dorsal surface sparsely and finely punctate and slightly transverse-rugose, rugosity becoming more pronounced and punctation more dense and coarse caudad; ninth abdominal segment (Fig. j) obliquely truncate, truncate surface strongly concave with acute margins; tenth abdominal segment (Fig. h) in small semi-circular orifice on basal quarter of venter of ninth abdominal segment and bearing two mammiform papillæ. Spiracular area of segments one to eight (Fig. h) oblong, with small almost circular spiracles on anterior dorsal margin. Length 27 mm.

The nidus in which I found these larvæ was composed of deep leaf mould and decayed wood. They seemed very sensitive to light and very rapidly burrowed away when unearthed. Several were collected and placed in rearing cages. Three days later (May 5) three of the larvæ had pupated. The last larval exuvia were preserved for future identification of this species of larva.

Pupa: (Fig. I.) Free: arcuate; cream colored with ferrugineous tinge on pronotum; femora, tibia, head, and tarsi fuscate. Just before emerging the pupa becomes much more strongly colored. Head bent strongly venterad; maxillary palpi very prominent, securiform; eyes almost black. Tips of wing cases extend slightly beyond the anterior margin of second abdominal segment. Metatarsi almost attain posterior margin of fifth abdominal segment. Posterior margin of metanotum bears a pair of highly chitinized black securiform protuberances which are opposed by a pair of black, chitinized, concave, areas on the anterior margins of the first abdominal segment. First to fifth abdominal segments bearing on sides of tergites two-lobed protuberances, lobes pointed and anterior one directed upward on first to third segment; sixth segment bears a one-lobed protuberance; seventh segment small, and very narrow dorsally; eighth segment ending in a pair of slightly divergent simply pointed processes. Dorsal surface of eighth segment slightly concave. Length 15 mm.

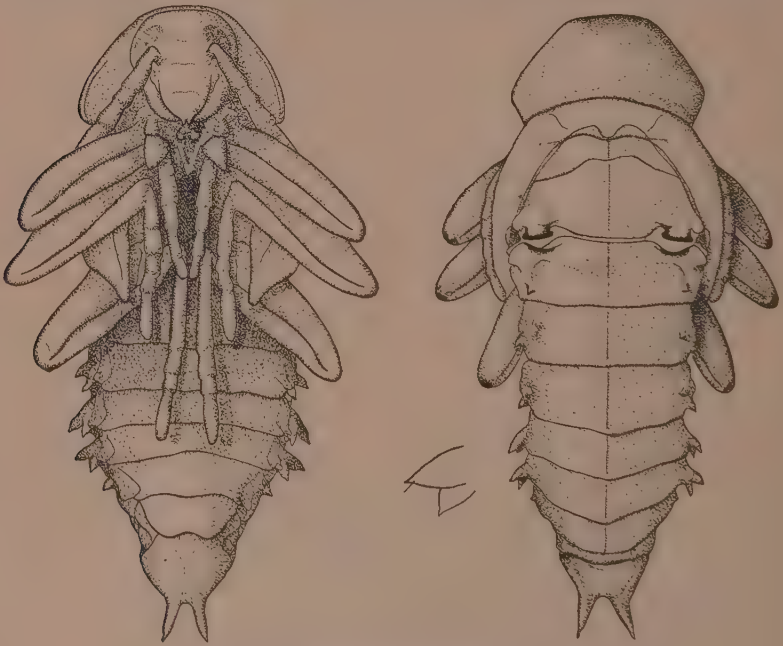

Fig. 1. *Meracantha contracta.* Pupa.

A fourth individual was about half transformed to a pupa when it was attacked and killed by the larva of a Coleopteron that I have not had determined. The predaceous larva was white in color and very much flattened dorso ventrally, and was placed in the cage with the *Meracantha* while collecting. It killed its host by eating into the thorax. Two weeks after pupation the first adult emerged. When first transformed it was quite uniformly cream white; the legs and pronotum soon became infuscate, then brown and were followed by the elytra becoming darker. Finally the entire beetle assumed the bronze black color of the mature imago.

One of the larvæ that pupated on May 5 did not decay, as did the other pupæ that failed to becomes beetles, and on June 14 a Bombyllid fly, *Anthrax alternata* Say.,[1] emerged from it. The pupa of this parasite is quite active just prior to the emergence of the adult. It is provided with a row of backwardly directed spines on the dorsum of each abdominal segment, and the dorsum of the terminal segment bears four stout spines and is terminated by a pair of prongs (Fig. IId). By alternately flexing the body forward and backward, the spines preventing any backward movement of the sclerites, the pupa moves forward. It pushed off the prothorax and head of its host pupa (Fig. IIc) and protruded from the opening thus formed (Fig. IIa) until the adult parasite emerged. The head capsule of *Anthrax* (Fig. IIb) is armed with three pair of stout teeth which probably assist in the act of emerging from the host. The adult *Anthrax* emerged from its chrysalis by forcing off the pupal head capsule and splitting the dorsum of the pronotum. How this parasite locates the larvæ of *Meracantha*, which never come above ground as far as I have observed, where she oviposits, and the period the parasite spends within its host still remains to be determined.

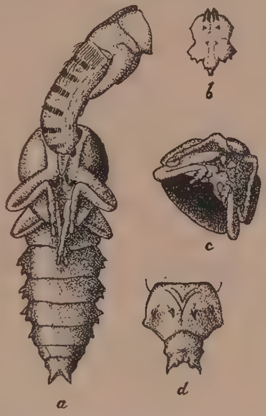

Fig. 2. *Meracantha contracta*. Pupal case and pupal case of parasite, *Anthrax alternata*.

In August of the same year I again made observations on *Meracantha contracta*. On this occasion I was collecting the larvæ of *Sericosomus viridanus* Say. from under the moss, *Polytrichum ohioensis*, on the top of the same mountain range but near

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[1] Determined by Mr. W. R. Walton.

Myersville, Md. Living *Meracantha* larvæ were found though, from the cast larval skins and dead larvæ, they must have been much more numerous earlier in the season. In four distinct cases I found the empty skins of the Tenebrionid larva with one or two *Tachinid* puparia close by. In every case, however, the parasites had emerged. A number of these puparia were collected and later observations proved them to be of a *Neopales* sp. n.[1]

On November 21 I made my last trip to the mountains for that season. At the same spot, where I collected the *Neopales* puparia in August, I collected several larvæ of *Meracantha.* The larvæ were placed in rearing cages and passed the winter in this stage. On May 23, 1914, the cage was examined and one of these larvæ was found to have pupated, the adult emerging six days later. Another larva pupated between May 25 and May 27, and from this pupa the adult emerged on June 5. From our observations we conclude that the pupal stage of this beetle endures from ten to fourteen days.

Two larvæ from the same material were killed by *Neopales* and, on May 23, a parasite larva emerged from each host larva and pupated. The adult *Tachinid* emerged on June 4, which limits the puparium stage to twelve days. This *Tachinid* must pass the winter within its host.

EXPLANATION OF PLATE 4.

Meracantha contracta (Beauv.), larva and details.

Fig. a, Dorsal aspect.
b, Hypopharyngial chitinization.
c, Antennæ.
d, Left mandible, inner face, 1, molar area.
e, Labium and maxillus. 1, labium; 2, mentum; 3, submentum; 4, articular membrane between submentum and cardo; 5, cardo; 6, maxillary stipes; 7, lacinea; 8, maxillary palpus; 9, labial palpus; 10, labial stipes; 11, gula; 12, ligula.
f, Left mandible, dorsal face.
g, Left mandible, outer face.
h, Seventh, eighth, ninth, and tenth abdominal segments, ventral aspect.
i, Left mesothoracic leg.
j, Ninth abdominal segment, lateral aspect.

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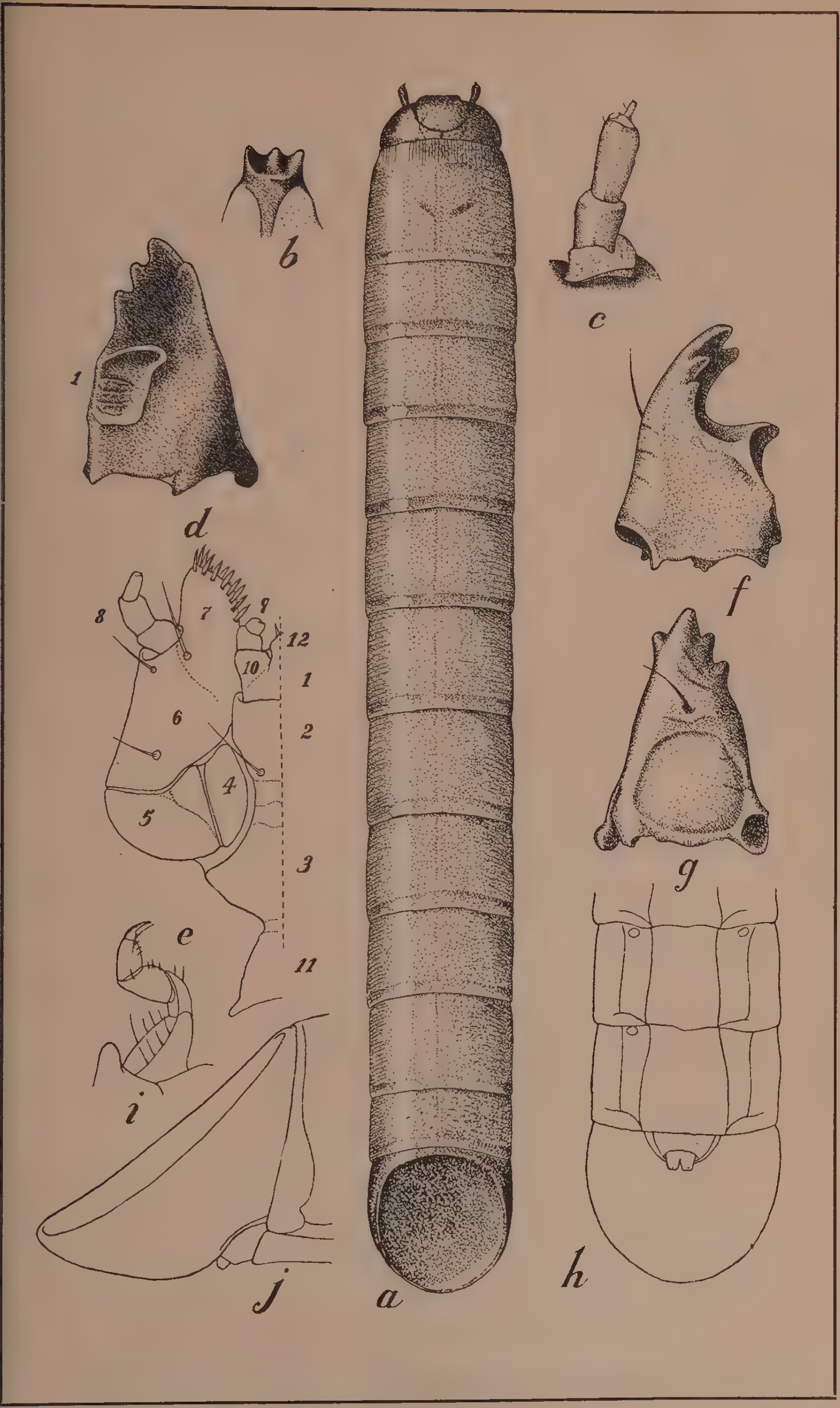
[1] Determined by Mr. W. R. Walton.

later described by Greene < Proc. Ent. Soc. Wash. 23, p. 126-1921)
as Phorocera meracanthe sp. n.



HYSLOP—*Meracantha contracta.*

A NEW SPECIES OF PSEUDOTEPHRITIS.

By Charles W. Johnson,
Boston Society of Natural History.

Pseudotephritis metzi sp. nov.

Female: Front yellowish pollinose, thickly dispersed with fine black punctures each bearing a small hair, vertex grayish with two orbital and two ocellar bristles, a large round spot on the occiput back of the ocelli with two bristles, and two small dots on each side also bearing bristles, occipital orbits with a row of seven bristle bearing dots, the two lower ones slightly removed from the others; face yellowish pollinose with numerous fine hairs; palpi and antennæ yellow, the third joint brown. Thorax grayish pollinose thickly punctured with black, each puncture bearing a minute hair, dorsum with eight large spots arranged alternately in four rows. In front of the scutellum is a short black line with two bristle bearing dots on each side, above the wing and on the pleura are large irregular spots; scutellum with two large shining discal spots, and four marginal bristle bearing dots, under side of the scutellum with two large black spots with a yellowish band below; metanotum grayish above, shining black below. Abdomen grayish pollinose, finely punctated with black and with short fine black hairs; first segment subshining, third with two large black quadrate spots on the anterior margin and two oblong spots on the posterior margin, the latter narrowly separated by a dorsal line; fourth with similar markings but closer together and occupying the middle third of the segment, first segment of the ovipositor broad, truncated at the end, slightly pollinose and shining. Legs: femora except the tips and a sub-basal and subapical band on the tibiæ, brownish black, the remainder yellowish. Halteres white. Wings hyaline, with blackish markings arranged as follows—a slight clouding at the humeral cross-vein and across the base of the basal cells; a large spot or band commences near the end of the first costal cell extending across the second, the marginal, base of the submarginal and middle of the first basal cell; another large spot starts near the middle of the discal and extends across the third posterior cell to near the end of the sixth longitudinal vein. There is also a small spot at the base of the third posterior cell, a small spot at the end of the auxilliary vein, a large spot at the end of second costal cell extending irregularly to and slightly beyond the anterior cross-vein, a large spot halfway between the ends of the first and second longitudinal veins, a spot on the posterior cross-vein and an apical band extending from the tip of the marginal to the tip of the second posterior cells. Length 7 mm. Wing 6 mm.

One specimen. Cold Spring Harbor, Long Island, N. Y. Collected by Mr. C. W. Metz.

The species resembles *P. vau* Say., in the arrangement of the costal spots but the spots are not connected with those of the posterior margin by large yellowish cloudings. The apical spot is larger than in *P. vau.*

NEOMYRMA *VERSUS* OREOMYRMA.

A CORRECTION.

By William Morton Wheeler.

In a recent paper (Revue Suisse de Zoologie, Vol. 22, 1894, p. 275) Forel described an ant from Lake Tahoe, Nev. (6,275 feet) under the name of *Aphænogaster calderoni* and made it the type of a new subgenus, *Neomyrma.* On reading the description I suspected that he had redescribed an ant which I described several years ago (Journ. N. Y. Ent. Soc., Vol. 17, 1909, p. 77) as *Myrmica bradleyi* from Alta Meadow, Tulare County, Cal. (altitude 9,500 feet), but I could not believe that so experienced a myrmecologist would mistake a *Myrmica* for an *Aphænogaster.* Mr. W. M. Mann, who was presented with one of the cotype specimens by Professor Forel, has loaned it to me for comparison with the types of *M. bradleyi.* As I fail to find the slightest difference between the two forms I must regard Forel's specific name as a synonym. His subgeneric name, however, is not so easily disposed of. In 1914 (Psyche, Vol. 22, pp. 118–122, 1 fig.), I revised the American species of *Myrmica* allied to the European *M. rubida,* and for the group including this and the four American species *bradleyi* Wh., *mutica* Emery, *aldrichi* Wh., and *hunteri* Wh., I erected the subgenus *Oreomyrma.* It is clear, therefore, that *Oreomyrma* and *Neomyrma* are synonymous. Since both were published during the same year, it is necessary to determine which has priority of publication. I find that the number of Psyche containing the name *Oreomyrma* appeared in August, and as the number of the *Revue Suisse* containing the description of *Neomyrma* (in an appendix to a discussion of the genus *Camponotus!*) was published in May, there can be no doubt that the latter must replace the former name as a subgenus of *Myrmica.* It should be noted, however, that the type of Forel's subgenus is *Myrmica bradleyi* Wh., whereas that of *Oreomyrma* is *Myrmica rubida* Latreille.

A NEW FORM OF A SOUTHERN ANT FROM NAUSHON ISLAND, MASSACHUSETTS.

By Wm. M. Mann,
Bussey Institution, Harvard University.

In August, 1915, Mr. F. X. Williams and I spent part of a day collecting on Naushon Island, opposite Woods Hole, Mass. Among other insects characteristic of more southern regions we found several colonies of a large Aphænogaster, which were nesting beneath large stones on the tops of low hills near the shore. This proves to be an undescribed subspecies of *Aphænogaster treatæ* Forel, a species which, with its variety *ashmeadi* Emery, is found throughout the South Atlantic states and as far north as Connecticut. This occurrence on Naushon Island is an addition to the long list of insects and plants typical of the southern coastal region which occur also at isolated points on the north coast, as relicts of the ancient costal plain fauna and flora.

The subspecies may be characterized as follows:

Aphaenogaster treatæ Forel subsp. **wheeleri** nov.

Worker: Similar to *treatæ* in form, sculpture and pilosity, but differs in having the lamellæ at the base of antennal scapes broadly angulate in front, instead of evenly rounded. The color is much darker, being dark fuscous, with the front of head and the gastric dorsum piceous.

Female: Differing from *treatæ* in the following characters. The color is dark fuscous to piceous. The antennal lamellæ are very noticeably angulate in front. The epinotal spines are longer and less broad at the base. The wings are more deeply infuscated.

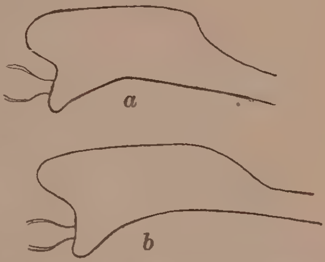


Fig. 1. *Aphaenogaster treatæ* Forel. a, antennal lamella of subsp. *wheeleri*, nov.; b, same of *treatæ* Forel.

Described from two females and numerous workers.

The darker coloration is very noticeable and constant in a large series of the new subspecies, compared with many specimens of the typical *treatæ* from various localities.

DENDROTETTIX QUERCUS PACKARD.

By A. N. Caudell,
Bureau of Entomology, United States Department of Agriculture.

The name of the above insect is an excellent illustration of confusion resulting from the use of manuscript names of insects before the species is described. The pertinent literature of this genus and species is as follows:

1887. Bruner, Bull. No. 13, Bur. Ent. Dept. Agric., p. 17–19. (Describes nymphs from Texas and discusses habits of the adult, including flight. No technical name used.)

1888. Riley, Proc. Ent. Soc. Wash., Vol. I, p. 86. (Mentions the genus *Dendrotettix* and the species *quercus* as new, gives locality as Missouri and expresses the intention of describing in the near future but here gives no characters at all.)

1890. Packard, Fifth Rept. U. S. Ent. Comm., p. 214. (Quotes in full the article of Bruner in 1887 and uses the name *Dendrotettix quercus* Riley MS.)

1891. Bruner, Can. Ent., Vol. XXIII, p. 191 and Ins. Life, Vol. IV, p. 20. (Uses the name *Dendrotettix longipennis* but mentions no characters other than the statement that both long and short winged specimens occur. The material here discussed is from Texas on oak and the statement is made that specimens taken in Missouri, also on oak, were described by Riley under the above name.)

1893. Riley, Ins. Life, Vol. V, p. 254. (Gives a good description of the genus *Dendrotettix* and of the species *longipennis*, the latter from 2 ♂ and 3 ♀ specimens from Texas. He also states that the specimens found in Missouri and formerly referred to by himself as *quercus* is probably of no more than varietal distinctness and is designated as *Dendrotettix longipennis* var. *quercus*.)

1897. Scudder, Rev. Melanopli, p. 91. (Uses generic name *Dendrotettix* with Riley as authority, dating it from 1893 but mentioning the 1888 reference as consisting of name only. The name of the species is given as *quercus* and the authority for it is given as Riley, both in this reference and in the Catalog of U. S. Orthoptera published three years later.

Considering the above articles chronologically from systematic and nomenclatorial viewpoints we at once dispose of the first one, Bruner 1887, as there is no scientific name at all used. The second reference, Riley 1888, is likewise passed over as no characters are there mentioned. We now come to the third reference, Packard 1890. Here a scientific name, *Dendrotettix quercus*, is used in connection with a printed description of structural characters. This fills all requirements for the valid establishment of genera and species and thus the genus *Dendrotettix*, with *quercus* as type, is to be credited to Packard, the first to validate it. The facts that Packard quotes Bruner's article of 1887, that he uses Riley's manuscript name and that the characters are described from immature specimens do not lessen the validity of the names established.

Now comes the question of the types of *Dendrotettix quercus* Packard. It seems obvious that the types are the nymphs from which Bruner drew up the description given in his article of 1887 and quoted by Packard in 1890. In the paper in which these nymphs are described Prof. Bruner states that specimens accompany the report, which was on an investigation made by him as an agent of the Division of Entomology of the U. S. Department of Agriculture. It is to be supposed that specimens of these nymphs were included, and, indeed, there are now in the National Museum, which has long been the depository of material gathered by the Division of Entomology, three nymphs from Texas which are evidently ones sent in by Bruner as they fit his description very well and bear the collection label of Prof. Riley as did all mateiral of this nature added to the collection in those days. One of these three nymphs, a female with wingpads as long as the pronotum, is therefore here designated as the type of *Dendrotettix quercus* Packard.

That *D. quercus* is the long winged form is clear from the well developed wingpads of the nymphs and from the statement in Prof. Bruner's report of the extended flight of the adults. Thus both specific names, *longipennis* and *quercus*, pertain to the macropterous form.

Regarding the author of the specific name *longipennis* there may also be some difference of opinion as the first use of that name was by Bruner in 1891. But no differentiating character was mentioned at this time, merely the statement that both long and short winged forms occur. Dr. Riley in 1893 was the first to validate this specific name and it is, therefore, to be credited to him. As stated above, this name falls into synonymy under the earlier established name *quercus*.

Considerable damage was done by the above locust during the past season near New Lisbon, N. J. Concerning them and the damage they did Mr. H. B. Scammell writes as follows: ". . . they infested the oak woods near New Lisbon, N. J., to an alarming extent. Some of the tallest oaks were nearly defoliated . . . The area infested approximated two square miles." Macropterous individuals and nymphs of both sexes were received from the collector for determination but no brachypterous specimens were sent. However, it is quite likely that both long and short winged forms were concerned here as in the case of injurious occurrence reported by Mr. Davis in 1912, Ent. News, Vol. XXIII, p. 2.

SOME TIPULID SYNONYMY.

By E. Bergroth,
Turtola, Finland.

The following notes are published as a sequel to those given by me in the *Annals and Magazine of Natural History* (8) XI, p. 578–584.

1. In the Canadian Entomologist 1913, p. 200–205, Alexander has described two Japanese species under the names *Dicranomyia japonica* and *D. nebulosa*. From the long subcosta and the structure of the male forceps it is clear that these two species belong to the genus *Limnobia*. Moreover, in *japonica*, the radial cross-vein is considerably removed from the tip of R_1, a structure which, as pointed out by Osten-Sacken, never occurs in *Dicranomyia*. Edwards (in letter) agrees with me as to the systematic position of these species, and I think there can be little doubt that *D. eiseni* Al., too, is a *Limnobia*. *D. gloriosa* and *lutzi*, both described by Alexander, should in my opinion also be placed in *Limnobia*, at least until the forceps in the still unknown males proves to be of the *Dicranomyia* type. Alexander's conception of these two genera seems to be so different from that of Osten-Sacken and all

other authors that an explanation how he distinguishes them is much to be desired.

2. In the above mentioned paper in the Annals and Magazine of Natural History (p. 580) I said that the palpi in *Aporosa* are placed at the apex of the rostrum. Not having at hand the scarce work of Webb and Berthelot, where Macquart first described *Aporosa*, I relied on Enderlein's statement, but Edwards, who has seen the work, has informed me that the palpi are removed from the apex of the rostrum and that Enderlein apparently had mistaken the "labellæ" in Macquart's figure for the palpi. *Aporosa*, therefore, is a synonym of *Geranomyia* Hal., as stated by Osten-Sacken.

3. Edwards (in letter) shares my opinion (l. c., p. 581) that *Liponeura* Skuse (incorrectly written "*Leiponeura*") is a good genus, but he has called my attention to the fact that the name is preoccupied by Loew for another genus of Diptera Nematocera. I, therefore, propose the name *Lipophleps* for it. Edwards does not think that *Lipophleps* is allied to *Atarba* O. S., as he has satisfied himself that *Atarba* has spurred tibiæ, a point of which Osten-Sacken was uncertain. If we attach the same importance as Osten-Sacken to the presence of tibial spurs, *Atarba* would be exceedingly difficult to locate systematically, for it can under no circumstances be placed in the Cylindrotominæ. Alexander has, however, shown by several examples that this character has been overrated, and it is known that the generic characters taken from the tibial spurs in the order Trichoptera cannot be relied on. Although Alexander (PSYCHE, 1913, p. 41) correctly states that "the presence of a cell R_2 is a tribal character, not generic as considered by Becker," he has in all his papers taken the view that this character is not even generic in the genus *Gonomyia*, and for this reason he regards *Lipophleps* as a subgenus of *Gonomyia*. I have previously given the reasons why I cannot agree with this point of view; still less can I agree with Alexander's opinion that species with a fundamentally different structure of the male genitalia can be congeneric.

4. Edwards has informed me that the figure of the wing of his *Thaumastoptera aldabrensis* is incorrect in several respects, that the venation in fact is the same as in the genus *Ptilostena* Bergr., save that R_3 is not turned upwards, and that the male propygium

of *aldabrensis* is almost quite identical with that of the type of *Ptilostena.* He therefore places *aldabrensis* without hesitation in *Ptilostena* which he thinks was correctly placed near *Gonomyia.* The upturned R_3 is only a specific character of *Pt. recurvinervis* Bergr.

5. Alexander has for some time placed *Empeda* as a subgenus of *Erioptera.* In this he differs widely from Schiner and Osten-Sacken who never even thought of the possibility of associating these two genera. I cannot help thinking that this innovation has very little to recommend it. In the paper where this new place was assigned to *Empeda* no reasons for the change were given, but later, speaking of *Erioptera brevior* Brun. (which is an *Empeda*), Alexander summarily says: "*Empeda* is merely an *Erioptera* in which the fusion of R_{2+3} is a little longer than usual." This fusion is, however, *much* longer in *Empeda,* so much in fact that, in opposition to *Erioptera,*[1] the radial cross-vein joins R_2 before its branching and that the cell R_2 assumes a quite different shape. And what of the other differences? Sc_2 is in *Erioptera*[1] removed very far backwards from the tip of Sc_1, whereas it is placed close to its tip in *Empeda;* the middle legs in *Erioptera* are strikingly shorter than the two other pairs, which is not the case in *Empeda;* and so on. Osten-Sacken regarded *Empeda* as very closely related to *Gonomyia,* and it comes in fact at least as near to this genus as to *Erioptera.* In *Erioptera* he included several heterogenous elements, and to add *Empeda* to them is only to increase the confusion. "Cu_1 tending to turn toward the apex of the wing" is given as a character of *Erioptera* in Alexander's key to the genera (Proc. U. S. Nat. Mus. 44, p. 492). This character fits some species of *Empeda,* but not all. If we unite *Empeda* with *Erioptera* and consider the fact that the length of Sc is rather variable in *Empeda,* and that the presence or absence of the cross-vein r is not perfectly constant as a generic character, we could quite as well unite *Gonomyia* with *Erioptera* and say: "*Gonomyia* is merely an *Erioptera* with the radial cross-vein wanting." The wing-venation of *Ptilostena aldabrensis* Edw. must be very similar to that of *Gonomyia blanda* O. S. (figured by Needham), and if the structure

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[1] Excluding *E. imbuta* Wied. which forms the very distinct monotypic genus *Chilotrichia* which comes nearer *Empeda* than any other Eriopterine genus and in no case can be referred to *Erioptera.*

of the propygium, as Alexander seems to think, is not of much importance as a generic character, we cannot separate *Ptilostena* from *Gonomyia*. In wing-venation and other characters *Sacandaga* Al. seems to differ very little from *Erioptera* (in Alexander's sense), although the author assures that the resemblance is probably merely accidental" (whatever that may mean) and that they are different "in general appearance." We would then have together there the whole series—*Erioptera-Ilisia-Mesocyphona-Chilotrichia-Empeda-Sacandaga-Gonomyia-Ptilostena-Lipophleps*—happily united in the same genus. But would this really clear up the study of the Eriopterinæ? In my opinion it would decidedly be a step backward. It seems much better to follow Needham, Edwards, and many other dipterists in regarding Osten-Sacken's so-called subgenera of *Erioptera* as distinct genera. They are much more sharply separated from each other than the subgenera (or rather groups) of *Limnophila* are, and there is scarcely any species of *Erioptera* (in its broad sense) that could not easily be determined as to its place in any of these genera. Of course certain species can in one or other respect approach towards some related genus, but this occurs in numerous genera in the whole animal kingdom without involving the necessity of giving up these genera. Lumping of genera is certainly in some cases better than the excessive and often absurd splitting so characteristic of Theobald's and Enderlein's writings, but it should not be done without adequate grounds. It must be admitted, however, that the Eriopterinæ leave a more open field to personal opinions than most other groups of Tipulidæ.

6. *Acyphona* O. S. must take the older name *Ilisia* Rond. (1856). Rondani after the description expressly states that *Erioptera maculata* Meig. is the type, and this was the only species he referred to the genus. That he many years later placed also two other species in it cannot, of course, invalidate its claim to recognition in its original comprehension. In describing two Japanese species of this genus Alexander says (Canad. Ent., 1913, p. 287) that *maculata* Meig. is the only described palearctic species of the genus, but the north-european *obscuripes* Zett. and *areolata* Siebke belong there, as shown by Wahlgren and Lundström.

7. Brunetti's book on the Indian Nematocera, which on a cursory examination makes such a good impression by the detailed

descriptions and excellent figures, reveals on closer scrutiny a great many partly almost incredible mistakes, the most curious of which concern what he calls *Gnophomyia* O. S. and which is not a genus at all, but a mixture of heterogeneous forms belonging to several widely different divisions. It is unnecessary to publish my numerous notes on his Tipulidæ, as they are almost identical with the remarks quite recently made by Alexander (Ins. Insc. Menstr., 1913, p. 118–120).

8. In my above-quoted paper (p. 584) I said, "Meigen did not state in his paper [of 1800] that he accepted the binominal nomenclature, and there is nothing in the paper indicating that he did so. Admittedly generic names in works of this class cannot be taken into consideration." Bezzi (in a letter to me) objects to this, and I now find that the same objections have been made already by Coquillett (Canad. Ent., 1908, p. 457) who wrote: "There is, first, the name of the proposed new genus in proper Latin form, then a description of the genus, followed by a statement of the number of species known to the author as belonging to the genus." All this is true, save that Meigen did not state the number of species for all his genera, but when Coquillett goes on to say that "the author, therefore, had a correct idea of binomial nomenclature, and, so far as he went, he applied it in this paper," we must take exception to this conclusion. What has Meigen's statement of the *number* of species belonging to some of his genera to do with *binominal* nomenclature? There are other authors (after 1758) who, though well aware of the binominal nomenclature, did not accept it but continued to designate their species by short diagnoses instead of specific names. Among these authors was even a fellow-countryman of Linnæus himself, who described many new species of insects without specific names. Briefly, the facts are these: we know that Meigen accepted the binominal nomenclature in 1803 and 1804, but we do not know if he did so in 1800, and the code forbids the recognition of names in such works. If we do accept these names, we can as well go back to the genera of the pre-Linnean period and revive them. To say the least, there are no cogent reasons why these names should be accepted, and such reasons failing we can safely follow Meigen's own lead and quit them for ever.

9. Some authors—among American dipterists, Johnson and Alexander—have adopted the principle that if two (or more) species have been described in the same genus under the same specific name, the species described later must be renamed *even if* the two species now belong to quite different genera. Johnson has, for instance, given a new name to *Oropeza annulata* Say., because it was described as a *Tipula*, and there is a *Tipula annulata* of Linné, which now is referred to *Discobola*, a widely different genus. Had Say. wrongly *cited* Linné's species as being the same as his own, the change would be just, but now it is quite unnecessary, and the general acceptance of such a principle would lead to disastrous consequences. Between 1758 and 1830 a very great number of species was described, but referred to a comparatively very small number of genera. The consequence of this is that the number of specific names preoccupied in this sense is immense, not in Diptera, as so many genera were founded as early as 1803, but in many other groups, as Lepidoptera and Mollusca. If all classes of animals are considered, the number of species, which must be renamed according to this rule, amounts to thousands. Kirkaldy's catalogue of the Pentatomidæ and some of his minor articles, with their sweeping and useless alterations of specific names, are a good warning in this respect; fortunately almost no hemipterist seems to have taken any notice of his new names of this class. As Sherborn's bulky volume, "Index animalium"—a result of many years' work—only includes the species described till 1800, and few persons have time and liking for looking up names preoccupied in this sense, it is a matter of course that the eventual new names alleged to be necessary in such cases could be introduced only little by little. In the meantime not even our most familiar names of animals could be safe from a sudden rebaptizing. As a confusion of two species bearing the same specific name, but belonging to different genera, is out of the question, a change of names in such cases serves no purpose, and it is sincerely to be hoped that zoölogists who have accepted the contrary principle would reconsider the position they have taken in reference to this matter. It is true that we then have to restore some of the older names now standing as synonyms, but the number of these names is very small as compared to the names of the other class.

A CURSORIAL TICK.

By Wm. M. Mann,
Bussey Institution, Harvard University.

During March and April, 1914, while traveling across the Sinaitic Peninsula and Arabia Petrææ with Dr. John C. Phillips, my attention was frequently attracted by the actions of a large, long-legged tick, which was one of the commonest Arthropods in this region. The vegetation here is very sparse, and mostly in the form of scrubby bushes, a couple of feet high which grow singly or in small clumps, at the bases of which sand collects, forming little hummocks. Most of the insects which we saw were among these bushes or in holes in the sand during the heat of the day.

While walking about searching for specimens, I often noticed that ticks came out from these hummocks and followed me. It was possible to attract them out by stamping on the ground in the vicinity. If I changed my direction they would do likewise, always at a frantically rapid pace, about equal to the slow walk of a man. It seemed ridiculous to be pursued in this manner by ticks, and I often walked slowly about, watching them follow. As long as I remained within a distance of ten or twelve feet they would continue the pursuit. Those which I permitted to reach me crawled about for a little while and then dropped off without biting.

This habit of running after its host is so different from the watchful-waiting policy of most of our ticks that it seems worthy of record. It is a habit that adapts this species to desert life, with its absence of trees and grass on which it can wait until the host passes by, so that it can drop off and fasten itself.

Mr. Banks has determined the species as *Hyalomma ægyptium* Linn. One of its hosts is the camel.

TWO MEXICAN MYRMECOPHILOUS MITES.

By Nathan Banks,
East Falls Church, Virginia.

Mr. W. M. Mann recently submitted to me some mites collected by him in Mexico from ants' nests. Two species are represented, both being new, their descriptions follow:

ORIBATIDÆ.

Galumna acutifrons sp. nov.

Dark brown. Body large, globose, cephalothorax small, in front ending in an acute point, and a minute point each side of it; no lamellæ, no superior bristles, inferior bristles curved toward each other, pseudostigmatic organ rather thick, short, semiclavate, tapering at tip. Abdomen without hairs, on base is an oblique dark spot each side; wings large, long, and deep, almost pointed in front, lower anterior edge scarcely emarginate, some radiating lines from base. Legs with only simple hairs, about as in *G. emarginata*. Sternal plate with two lines on each side; genital aperture slightly narrower behind than in front, about twice its length in front of the larger anal aperture, the latter much broader behind than in front. Length .75 mm.

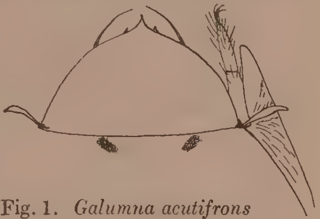

Fig. 1. *Galumna acutifrons* sp. nov. Cephalothorax above.

From San Miguel, Hidalgo, Mexico, with *Pheidole vasliti acolhua*, Mann coll.

PARASITIDÆ.

Neoberlesia mexicana sp. nov.

Yellowish. Body rather slender, in male more than twice as long as broad, in female almost twice as long as broad, tapering each way. Dorsal shield entire, with few scattered bristles, mostly behind. Legs slender, second pair heavier, especially in the male, the fourth pair much the longest, in male the femur IV has two long spines behind and a minute tooth nearer base, femur III with two stout bristles behind, otherwise legs have few, short, fine hairs, tarsi I and II with some short stout spines at tip. In male the ventral shields all united, but suture distinct between anal and ventral, anus nearer to tip than to base of shield; in female anal united to the ventral, vulva between coxæ III; only fine hairs on sternum; peritreme long and only slightly curved. Length 1.1 mm.

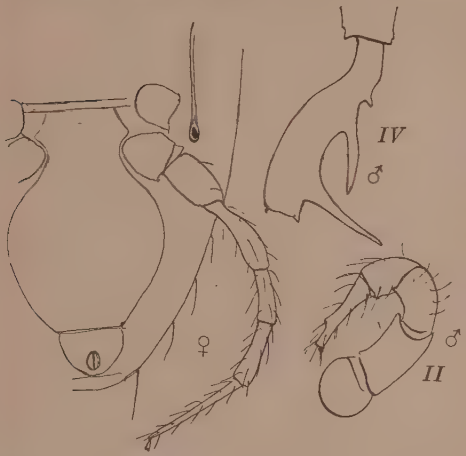

Fig. 2. *Neoberlesia mexicana* sp. nov. Venter of female, leg II, and femur IV of male.

From San Miguel, Hidalgo, Mexico, with *Pheidole vasliti acolhua*, Mann coll.

THE DIFFERENTIATION OF THE COCOONS OF *PELOPŒUS CÆMENTARIUS* AND *CHALYBION CÆRULEUM* (HYMEN.).

By Phil Rau,
St. Louis, Missouri.

A large number of mud-daubers' nests had been gathered for the purpose of a study of the contents of their cells. The nests appeared to be all of the same kind. While opening them, however, we were for a time puzzled by a variation in the structure of the cocoon. Some of the cocoons were of a rich brown color and of papery consistency, with smooth surface as though glazed (Fig. 2); others were of a whitish color and of soft, webby texture

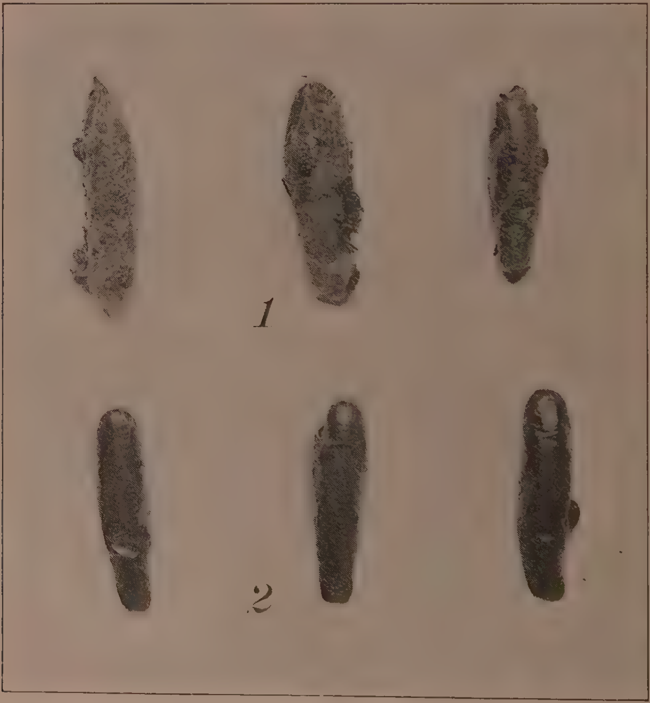

Fig. 1. 1, Cocoons of *Chalybion cæruleum;* 2, Cocoons of *Pelopœus cæmentarius.*

on the surface (Fig. 1.). Closer examination revealed that these were constructed exactly like the dark, firm ones, but with an additional covering. This sheath was of whitish silk, woven loosely into a webby, semi-transparent mesh; it covered the entire cocoon and fitted over it like a pillow-slip closed all around, and was entirely separate from it and could be slipped off without the slightest adherence. It seemed that it had been first constructed in the cell, and subsequently the firm, heavy shell was filled in quite independently.

The two forms of cocoons were so distinct, and the two types followed so accurately without deviation, that it could not long be considered merely the result of individual temperament. So the following year about three hundred of the cocoons were removed from the cells and sorted according to these two forms, and kept under conditions favorable to the development of the insect. Every one of the dark, smooth cocoons brought forth the yellow-legged Pelopæus (*Sceliphron*), while the cocoons with the additional webby covering gave forth without fail the steel-blue wasp, Chalybion.

In addition, a check experiment was carried on to avoid any error that might possibly arise due to artificial conditions. About one hundred mud nests, comprising several hundred cells, were individually placed in covered jelly glasses; when the insects emerged the species was noted and the remains of the cocoon examined, and in every case we found that the yellow-legged wasps had come from the plain cocoons and the metallic-blue ones from the cocoons with a caul.

A FLY PRESERVED IN PAPER.

I recently received from my friend, Mr. Germain Beaulieu of Ottawa, Canada, an interesting example of a fly preserved in a sheet of paper in which it had become evenly embedded during the process of manufacture. It was in the last leaf of Vol. VI of "Les Proverbes Dramatiques," printed in Paris by Lejay, rue St. Jacques au Grand Corneille, in 1773. The thinness of the paper makes it easy to study the venation which indicates the genus *Rhyphus*, and the color pattern, which is apparently still preserved, suggests *R. fenestralis*.

C. W. Johnson.

BOOK REVIEWS.

Fletcher, J. Bainbridge. Some South Indian Insects and other animals of importance, considered especially from an economic point of view. Royal Octavo; pp. vii+565; figs. 440; pls. 50. Madras, 1914. $2.25.

Aside from a number of short chapters on general topics, this large volume is concerned mainly with an enumeration of the more important economic insects of southern India. Under each species the information is arranged in short paragraphs dealing with the distribution, life-history, food-plants, status, control and natural enemies. Almost without exception each species is figured either by black and white text-figures or by colored figures arranged on plates; the latter, many of which have already appeared in other Indian governmental publications, are uniformly well executed and usually illustrate the developmental stages and injury in addition to the adult insects. The quality and the text figures are variable, some are good, but a few like those of the smaller parasitic hymenoptera and fleas are very crude.

The carefully systematized arrangement of the descriptive matter should make the text extremely useful not only to economic entomologists in India, but it will place in available form much information of great value to the agricultural population. To the latter, the list of crops with their attendant pests which occupies over twenty pages of the book will be especially welcome.

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Will exchange insects of various orders for Parasitic Hymenoptera from any part of the world.—C. T. Brues, Bussey Institution, Forest Hills, Mass.

Wanted. Ants from all parts of the world.—W. M. Wheeler, Bussey Institution, Forest Hills, Mass.

I pay cash or give American and exotic insects in exchange for fertile eggs of Catocala spp., *living* Catocala ♀ ♀ (captured specimens only), hibernating pupæ and larvæ of any other group of Lepidoptera.—William Reiff, 366 Arborway, Jamaica Plain, Boston, Mass.

Florida insects of all orders, also Fish, Batrachians, Reptiles, Shells and Marine Invertebrates sold by A. G. Reynolds, Gulfport, Florida.

New England Orthoptera identified. I wish to examine adult Orthoptera of all families from all parts of New England. Material will be identified for the privilege of retaining desired examples, for which good exchanges will be given, subject to approval of owner.—A. P. Morse, Wellesley College, Wellesley, Mass.

The undersigned will greatly appreciate receiving records of New Jersey species not listed in Smith's Insects of New Jersey.—Harry B. Weiss, 272 Hale St., New Brunswick, N. J.

Offered for cash, but exchange preferred. Fitch and early Illinois reports; Insect Life; Harris's Insect; many others.—J. E. Hallinen, Cooperton, Okla.

Histeridæ. North American Histeridæ identified or unidentified, desired in exchange for beetles of other families. F. G. Carnochan, Bussey Institution, Forest Hills, Massachusetts.

Hemiptera-Heteroptera. I desire specimens of this group from all regions, especially New England. I will give in exchange species of this and other orders (except Lepidoptera), and will identify New England material. Correspondence desired.—H. M. Parshley, Bussey Institution, Forest Hills, Mass.

Wanted: Psyche, Vol. VIII, No. 265 (May, 1898); No. 267 (July, 1898); No. 268 (August, 1898); Vol. IX, No. 300 (April, 1901). Address, giving price, Librarian, Stanford University, Cal.

Sarcophagidæ from all parts of the world bought or exchanged according to arrangement. North American material determined.—R. R. Parker, Entomological Laboratory, Massachusetts Agricultural College, Amherst, Mass.

Wanted: Transactions American Entomological Soc., Vol. 4; Entomological News, Vol. 2, Nos. 6 and 10; Vol. 8, Nos. 1 and 6; Vol. 9, Nos. 1 and 2; Vol. 10, No. 10; Vol. 11, Nos. 1, 3 and 5. Will purchase at reasonable price.—Howard L. Clark, P. O. Box 1142, Providence, R. I.

Wanted: Insects of any order from ant nests, with specimens of the host ants, from any part of the world; also Cremastochilinæ of the world. Will give cash or Coleoptera, Hymenoptera and Diptera from the United States.—Wm. M. Mann, Bussey Institution, Forest Hills, Boston, Mass.

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